

5.2 EARTH RESOURCES

The geology and soils analysis considers a ROI which includes the ORNL, as well as the rest of ORR. Potential effects to these resource areas were determined by assessing potential changes in existing geology and soils that could result from construction activities and operations under each of the alternatives.

5.2.1 Alternative 1 – No Action

Under the Alternative 1 - No Action, no FRP project activities would take place, therefore, no FRP effects to geology and soils would occur.

5.2.2 Alternative 2 – Remodel

Under Alternative 2, no effects to geological resources would be anticipated. Soil disturbance during remodeling activities could cause short-term effects to the soils surrounding the facility. Minor disturbances to the soil profile could occur at building, parking, and construction laydown areas surrounding the facility. Soil loss due to wind dispersion or erosion could occur, but this would be minimized through erosion minimization practices.

5.2.3 Alternative 3 – Brownfield

No effects to underlying geological resources would be anticipated as a result of construction and operation of facilities on the proposed Brownfield Site because shallow footings would be used to minimize excavation and the hazards posed by geological conditions are expected to be minor. Slopes and underlying foundation materials are generally stable at ORNL. Landslides or other non-tectonic events are unlikely to affect project activities. In general, karst appears most developed in association with the Knox Group carbonate bedrock, whereas karst is less developed in the Chickamauga Group carbonates that underlie the ORNL facilities. Sinkholes are present in the Knox Dolomite, but are not present at the proposed Brownfield Site.

Although a moderate seismic risk exists at ORNL, it should not hinder the construction and operation of the new facilities. The local foundation soils are not susceptible to liquefaction during or after seismic events. New and remodeled DOE buildings would be designed to withstand the maximum expected earthquake-generated ground acceleration in accordance with DOE O 420.1, *Facility Safety*, and accompanying guidelines.

5.2.4 Alternative 4 – Greenfield

Localized effects to underlying geological resources could occur as a result of construction of new facilities on a Greenfield Site due to the extensive grading and excavation that would be required within the Greenfield Site. Approximately 18 ha (45 acres) would be directly affected by clearing and grading if Alternative 4 were implemented. An estimated total of 318,817 cubic meters (m³) [417,000 cubic yards (yd³)] of earth and rock would be cut from the site. An estimated total of 110,860 m³ (145,000 yd³) of fill material would be required. Materials from the cut would be utilized if suitable. If suitable fill from the cut material were not sufficient, fill would be obtained from borrow sites on the ORR. These potential impacts to soil resources would also be greater at the Greenfield Site than the Brownfield Site because it is an undisturbed area. As with Alternative 3, seismic events should not hinder construction and operation of new facilities. Geotechnical borings and a more detailed evaluation of the Greenfield Site would be needed before action was taken to minimize potential karst hazards and verify foundation suitability.